

REMARKS

The present invention relates to a process for producing resins that can be prepared, stored, treated and transported as a dispersion or solution containing high solids concentrations without product deterioration from polymer crosslinking, such as gelation problems

By the present amendment and response, claims 1, 8, and 36-38 have been amended. Claims 1-29 and 31-39 are pending in the present application. Reconsideration and allowance of pending claims 1-29 and 31-39 in view of the following remarks is respectfully requested.

Claim Objections

The Office Action objected to claim 9 under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of the previous claim.

Applicants acknowledge that the pH range recited in claim 9 is not properly within the range recited in claim 8. Applicants have amended claim 8 to recite the range of pH of "of from about 6 to about 9." This amendment now places claim 9 in proper dependent form. The support for the amendment may be found on page 14, line 12 of the specification.

Applicants respectfully submit that this amendment to claim 8 overcomes the basis for the objection to claim 9. In view of the amendment to claim 8, applicants respectfully submit that claim 9 is now in proper dependent form.

Rejection Under 35 U.S.C. §112, First paragraph.

The Office Action rejected claims 1-21 and 34-37 under 35 U.S.C. §112, first paragraph, as based on a disclosure which is not enabling.

The Office Action states that, "Claims 1-21 and 34-37 encompass a treatment process that includes treating composition containing a wet strength polyamine-epihalohydrin resin comprising a solids content to at least 15 wt% with an enzymatic agent to inhibit, reduce or remove a CPD-forming species. The final amount of CPD-forming species remaining in the composition after the enzyme treatment is defined in term of the 'ACID TEST'. That is, the treated composition when stored for 24 hours at 50°C, and a pH of about 1.0 releases less than about 100 ppm dry basis of CPD."

The Office Action briefly discusses the Examples contained in the instant specification and summarized this discussion by stating that "...only Examples 3, 24, and 25 are drawn to treatment methods that treat a starting composition with a solids content of at least 15 wt% wherein the treatment method includes the claimed enzyme treatment and establishes that the treated composition 'when stored for 24 hours at 50°C, and a pH of about 1.0 releases less than about 100 ppm dry basis of CPD'." The Office Action additionally states that "... the biodehalogenation step is critical to the invention since each of these examples also included a biodehalogenation step as part of the treatment process that resulted in a treated composition 'when stored for 24 hours at 50C, and a pH of about 1.0 releases less than about 100 ppm CPD'".

Applicants respectfully traverse the rejection of claims 1-21 and 34-37 under 35 U.S.C. §112, first paragraph and respectfully submit that the specification fully complies with the enablement requirement. Additionally, applicants respectfully submit that, while the Examples briefly discussed by in the Office Action do utilize the biodehalogenation step as a means to reduce the amount of CPD present in the resin samples recited therein, the specification discloses additional treatments that may be used to reduce or remove the CPD-forming species contained in the resins. Applicants respectfully direct the Examiner's attention to the passage beginning on page 31, line 20 and continuing on to page 32 of the specification, as filed. In this passage, applicants disclose the use of

biodehalogenation. Additionally, applicants disclose alternative ways to remove the CPD present in the resin samples by treating the resin "with a base ion exchange column, such as disclosed in U.S. Pat. No. 5,516,885 and WO 92/22601; with carbon adsorption, such as disclosed in WO 93/21384; membrane separation, e.g., ultrafiltration; extraction, e.g., ethyl acetate, such as disclosed in U.S. Statutory Invention Registration H1613;" (page 32, lines 4-8) as well as referencing "any combination of CPD-forming species reduction or removal as disclosed in the above-noted U.S. patent application Ser. Nos. 09/592,681, 09/363,224, and 09/330,200, each of which is incorporated by reference in its entirety, can be utilized with the enzymatic treatment for reduction and/or removal of CPD-forming species." (Page 32, lines 11-15).

Applicants respectfully submit, that since the above-mentioned patents, patent applications and statutory invention registration have been properly incorporated by reference in their entirety in the specification, the assertion that biodehalogenation step critical to the invention as well as the application only enables the use of biodehalogenation is incorrect.

Applicants respectfully assert that the rejection of claims 1-21 and 34-37 under 35 U.S.C. §112, first paragraph, as based on a disclosure which is not enabling has been traversed. Applicants respectfully request that the rejection of claims 1-21 and 34-37 under 35 U.S.C. §112, first paragraph be withdrawn and request allowance of claims 1-21 and 34-37.

Rejections Under 35 U.S.C. §102.

The Office Action rejected claims 1-12, 14-16, 18-25 and 34-36 under 35 U.S.C. §102(e) as anticipated by Riehle et al. (US 6,554,961 or US2003/0205345).

Applicants respectfully traverse the rejection of claims 1-2, 14-16, 18-25 and 34-36 under 35 U.S.C. §102(e) as anticipated by Riehle et al. (US 6,554,961 or

US2003/0205345) since Riehle et al. does not teach or disclose all of the elements of the present invention, as claimed.

The Office Action states that "...the reference Riehle et al. discloses a process for rendering a polyamine-epihalohydrin resin storage stable, that includes treating a composition containing a wet strength polyamine-epihalohydrin resin, the composition comprising a solids content of at least 15 wt% (21%, see Example 75) and including CPD-forming species, with at least one enzymatic agent....).

Applicants respectfully submit that the teachings of the present invention are clearly distinguished from the teachings of Riehle et al. and respectfully direct the Examiner's attention to the following passage in Riehle et al. where "In Example 75 of US 6554961, the UNTREATED resin has a solids content of 21% however BEFORE treatment the resin is diluted (see col. 89, lines 51-55)." Applicants respectfully assert that "...to treat a resin with a solids content of above 15%, which is claimed in the present invention, is not taught in Riehle US 6554961."

In order to expedite the prosecution of the present case and to clarify the presentation of their claims, applicants have amended claims 1 and 36 to clearly recite that "the solids content of the composition containing a polyamine-epihalohydrin resin is at least 15 wt% when treated with the at least one enzymatic agent."

The Office Action also states that "[W]ith respect to the additional claim limitation that the resin employed in the method 'is formed in a reaction having a molar ratio of epihalohydrin to secondary amine group of less than [sic] about 0.50'." The Office Action also notes that "...Riehle et al. discloses employing resins formed in a reaction having a molar ratio from about 0.50 to about 1.8." and that the claim language "less than about 0.5' would include 0.50".

Applicants have amended claims 1 and 36 to remove the term "about" before the term "0.50" so that it clearly does not overlap with the molar ratio taught in Riehle et al.

In view of the above discussion, applicants respectfully assert that the rejection of the above-identified claims, as presently amended, as anticipated by Riehle et al. is overcome since Riehle et al. clearly never contacts the resins taught therein with enzymes at a high solids level, but rather teaches only up to a level of 13.5% solids content. The present invention is directed to the enzymatic treatment of resins at high solids levels, e.g., at least 15 wt%. Additionally, Riehle et al, clearly does not teach below 0.50 while the present claims have been amended to recite "less than 0.5".

Applicants respectfully assert that the rejection of claims the rejection of claims 1-12, 14-16, 18-25 and 34-36 under 35 U.S.C. §102 (e) as being anticipated by Riehle et al., has been traversed. Applicants respectfully request that the rejection of claims 1-12, 14-16, 18-25 and 34-36 under 35 U.S.C. §102 (e) be withdrawn and request allowance of claims 1-12, 14-16, 18-25 and 34-36.

Rejections Under 35 U.S.C. §103.

The Office Action rejected claims 1-13, 19-21 and 34-37 under 35 U.S.C. §103(a) as being obvious over Bull et al. (US 5,470,742) in view of Miller et al. (US 5,171,795).

The Office Action states that "[W]ith respect to claims 1 and 2, the reference of Bull et al. discloses a method of rendering a polyamine-epihalohydrin resin storage stable. The method discloses treating a composition containing a wet strength polyamine-epihalohydrin resin including a solids content of at least 15 wt%. The composition is treated with at least one enzymatic agent under conditions to at least one of inhibit, reduce and remove CPD-forming species."

Applicants respectfully traverse the rejection of rejected claims 1-13, 19-21 and 34-37 under 35 U.S.C. §103(a) as being obvious over Bull et al. in view of Miller et al. for the reason that if a person having ordinary skill in the art was to make the combination of

the teachings of Bull et al. with Miller et al., the combination would not result in the instant invention as claimed.

The Office Action states that "...Bull et al. discloses a method of rendering a polyamine-epihalohydrin resin storage stable. The method discloses treating a composition containing a wet strength polyamine-epihalohydrin resin including a solids content of at least 15 wt% (See column 6, lines 43-48)."

Applicants respectfully disagree with the Office Action as to the teaching of Bull et al. A review of the passage referenced in the Office Action makes it clear that the concentrations referred to in the passage relate to the weight percent of the nitrogen-containing cationic polymer preferably present in the compositions recited therein, but not the concentrations at which those resins may be treated to remove organohalogen-containing compounds contained in those resins. The passage referenced is clearly not directed to disclosing the method for treating compositions. In passages where Bull et al. discusses the treatment of compositions for the removal of contaminants, the concentration of the nitrogen-free organohalogen-containing compound taught therein is at most 12.5% solids on a wet basis. (Please see column 9, lines 5-11.) In the examples provided in Bull et al., examples 5 and 8 disclose the biocatalytic dehalogenation of a polyamide wet strength resin having 12.5% w/w active solids while Example 7 discloses the treatment of 11.75% w/v resin. Bull et al. does not disclose treating strength resins at the higher concentrations as claimed by the applicants or suggest the desirability of modifying the concentrations recited in its specification to achieve treatment of the compositions at the higher concentrations claimed by applicants.

Miller et al. relates to a process for the synthesis of improved, water soluble polyaminopolyamide-epichlorohydrin resins. In the process disclosed therein, a broad range of equivalents of epichlorohydrin to secondary amine content of a starting

polyaminopolyamide resin is recited. This broad range is from 0.05 to 1.5 molar equivalents of epichlorohydrin to secondary amine which encompasses more of a range of epichlorohydrin to secondary amine which is above the ratio contained in the present claims than which is within the range. In fact, the preferred recited ratio of epichlorohydrin to secondary amine of Miller et al. is above the ratio contained in the instant claims.

However, more importantly, Miller et al. contains no teaching or suggestion regarding the concentration at which a biocatalytic dehalogenation of a polyamide resin is to occur. In fact, Miller et al. does not teach or suggest the use of any biocatalytic dehalogenation of polyamide resins. Therefore, the applicants respectfully submit that the teachings of Miller et al. could not motivate or provide a suggestion to a person of ordinary skill in the art to increase the concentrations at which Bull et al. performs its biocatalytic dehalogenation of a polyamide resin.

Additionally, applicants respectfully wish to clarify one aspect of regarding the teachings of Bull et al. In particular, applicants respectfully assert that Bull et al., while a useful process for performing biodehalogenation on resin compositions which are being treated by the process of the present invention, do not result in a polyamine-epihalohydrin resin which is storage stable.

Among the various patent applications incorporated by reference in its entirety in the present specification was 09/592,681 (now US Patent No. 6,554,961). In US Patent No. 6,554,961, beginning on column 33, there are comparative examples presented. Of note are comparative examples 2 and 3 found on columns 34 and 35 of which pertain to the practice of biodehalogenation, similar to the practice of biodehalogenation taught in Bull et al. Referring to the Table 2 on column 35 and Table 3 on column 36 of US Patent No. 6,554,961 in which the biodehalogenated resins were subjected to accelerated aging, it is clear that the initial low levels of CPD contained in the biodehalogenated

resins are not maintained. Rather the levels of CPD rise in the samples when exposed to temperature over time. These are clearly not stable resins.

In view of the above results, Applicants respectfully submit that the teachings of Bull et al. do not teach or disclose the production of stable compositions of the present invention, but rather are a useful method of reducing easily available CPD.

Applicants respectfully submit that the rejection of claims 1-13, 19-21 and 34-37 under 35 U.S.C. §103(a) as being obvious over Bull et al. (US 5,470,742) in view of Miller et al. (US 5,171,795) has been traversed since Bull et al. does not teach biocatalytic dehalogenation of a polyamide resin at the higher concentrations claimed by the applicants and the teachings of Miller et al. could not motivate or provide a suggestion to a person of ordinary skill in the art to increase the concentrations at which Bull et al. performs its biocatalytic dehalogenation of a polyamide resin.

In view of the foregoing, applicants respectfully request the withdrawal of the rejection of claims 1-13, 19-21 and 34-37 under 35 U.S.C. §103(a) as being obvious over Bull et al. (US 5,470,742) in view of Miller et al. (US 5,171,795) and allowance of the above mentioned claims.

Double Patenting

The Office Action rejected claims 1-13 and 19-21 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 7-13 and 15-20 of U.S. Patent No. 6,552,961 in view of Bull et al. and Miller et al.

The Office Action states the “[C]laims 7-13 and 15-20 of U.S. Patent No. 6,554,961 encompass a method of treating a polyamine-epihalohydrin resin composition that includes CPD-forming species....” The Office Action goes on to state that “[T]he above claims differ by reciting the starting composition includes a solids content of at least 15 wt% and includes a CPD-forming species final content of less than 100 ppm.”

The Office Action then combines the teachings of Bull et al. and Miller et al. as in the previous rejection of claims 1-13, 19-21 and 34-37 under 35 U.S.C. §103(a), with Bull et al. being provided to teach biocatalytic dehalogenation of a polyamide resin at the higher concentrations and Miller et al. being provided to teach the formation of polyaminopolyamide-epichlorohydrin resins using molar ratios of epihalohydrin to secondary amine groups in the range of 0.05 to 1.5.

Applicants respectfully traverse the rejection of claims 1-13 and 19-21 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 7-13 and 15-20 of U.S. Patent No. 6,552,961 in view of Bull et al. and Miller et al. for the reasons as set forth applicants response to the rejection of claims 1-13, 19-21 and 34-37 under 35 U.S.C. §103(a) hereinabove.

US Patent No 6,554,961 never teaches contacting resins with enzymes at a high solids level, but rather teaches only up to a level of 13.5% solids content. As previously presented, applicants respectfully submit that Bull et al. does not teach biocatalytic dehalogenation of a polyamide resin at the higher concentrations claimed by the applicants and the teachings of Miller et al. could not motivate or provide a suggestion to a person of ordinary skill in the art to increase the concentrations at which Bull et al. performs its biocatalytic dehalogenation of a polyamide resin. As such, it would not be obvious to a person having ordinary skill in the art to combine the teachings of U.S. Patent No. 6,552,961 with the teachings of Bull et al. and Miller et al. to arrive at the applicants invention as claimed in claims 1-13 and 19-21.

As also previously discussed, Bull et al., while a useful process for performing biodehalogenation on resin compositions which are being treated by the process of the present invention, does not result in a polyamine-epihalohydrin resin which is storage stable, as previously discussed in the response to the rejection of claims 1-13, 19-21 and 34-37 under 35 U.S.C. §103(a) hereinabove.

In view of the above, applicants respectfully submit the rejection claims 1-13 and 19-21 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 7-13 and 15-20 of U.S. Patent No. 6,552,961 in view of Bull et al. and Miller et al. has been traversed. Applicants respectfully request withdrawal of this rejection and allowance of the claims.

If the applicants arguments regarding the rejection of claims 1-13 and 19-21 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 7-13 and 15-20 of U.S. Patent No. 6,552,961 in view of Bull et al. and Miller et al. are deemed to be unpersuasive, applicants agree to submit the necessary terminal disclaimer over US Patent No. 6,554,961 to remove this basis for rejecting the claims once the other bases for objection and/or rejection of the pending claims have been removed.

Allowable Subject Matter

While applicants respectfully agree with the Office Action regarding the allowable subject matter contained in claims 26-33 and 38, applicants respectfully disagree with what the prior art discloses with regards to enzymatic treatment of compositions including polyamine-epihalohydrin resins with solids content of at least 15 wt% to remove CPD-forming species from the composition, as set forth in applicants response to the rejection of claims 1-13, 19-21 and 34-37 under 35 U.S.C. §103(a) as being obvious over Bull et al. in view of Miller et al. hereinabove.

CONCLUSION

In view of the foregoing, Applicants respectfully request withdrawal of the above-mentioned rejections of record, and the allowance of all pending claims, and the holding of this application in condition for allowance. If any points remain of issue that may best

be resolved through a personal or telephonic interview, the Examiner is respectfully requested to contact the undersigned at the below-listed telephone number.

Except as otherwise stated in the above-noted remarks, Applicants notes that each of the amendments have been made to place the claims in better form for U.S. practice, not to distinguish the claims from prior art references, otherwise narrow the scope of the previously pending claims or comply with the other statutory requirements.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Robert O'Flynn O'Brien', written over the typed name.

Robert O'Flynn O'Brien
Attorney for Applicant(s)
Reg. No. 35,629

Hercules Incorporated
Intellectual Property Section
Hercules Plaza, 1313 N. Market Street
Wilmington, DE 19894-0001
Agent's Phone: (302) 594-6953
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